

REMARKS/ARGUMENTS

No new matter has been added.

The Office Action mailed August 25, 2004, has been received and reviewed. Claims 1 through 7 are currently pending in the application. Claims 1 through 7 stand rejected. Applicants have amended claim 7, and respectfully request reconsideration of the application as amended herein.

Preliminary Amendment

Applicants' undersigned attorney notes the filing herein of a Preliminary Amendment on January 9, 2004, which filing was not acknowledged in the outstanding Office Action. Should the Preliminary Amendment have failed for some reason to have been entered in the Office file, Applicants' undersigned attorney will be happy to have a true copy thereof hand-delivered to the Examiner.

Double Patenting Rejection Based on U.S. Patent No. 6,472,901

Claims 1 through 3 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 through 7 of U.S. Patent No. 6,472,901. In order to avoid further expenses and time delay, Applicants elect to expedite the prosecution of the present application by filing a terminal disclaimer to obviate the double patenting rejections in compliance with 37 CFR §1.321 (b) and (c). Applicants' filing of the terminal disclaimer should not be construed as acquiescence in the Examiner's double patenting or obviousness-type double patenting rejections. Attached are the terminal disclaimer and accompanying fee.

As a note, the Office Action specifically states that:

Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both directed to the method for in situ electrical testing of a flip-chip semiconductor assembly during its manufacture (see claims 1). The only difference is the changing the term "said" in Patent 6,472,901 to --the-- throughout the claims of the instant application; however, --the-- is broad enough to include "said" in the patent '901. (Office Action, p. 2).

Applicants respectfully point out that independent claim 1 of the '901 patent reads (in part):

. . . said repairing comprising at least one of:
repairing one or more defective circuit traces on said substrate; and
repairing one or more defective conductive pads on said substrate;

In contrast, Applicants' instant application correspondingly reads (in part):

. . . the repairing comprising at least one of:
removing and replacing at least one of the one or more IC dice of the assembly;
repairing the interconnection bumps of the at least one of the IC dice of the
assembly; and
repairing at least one of the conductive pads of the substrate;

While Applicants are electing to expedite prosecution through the filing of a terminal disclaimer, Applicants respectfully assert that the claims are patentably distinct.

35 U.S.C. § 112 Claim Rejections

Claim 7 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 7, as amended and presented herein, states "conductive pads on the electrical pads". As amended, claim 7 is no longer indefinite and Applicants respectfully request the rejection be withdrawn.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,258,648 to Lin

Claims 4 through 7 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lin (U.S. Patent No. 5,258,648). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention

must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants submit that the Lin reference does not and cannot anticipate under 35 U.S.C. § 102 the presently claimed invention of independent claim 4, and claims 5-7 depending therefrom, because the Lin reference does not describe, either expressly or inherently, the identical inventions in as complete detail as are contained in the claims.

The Office Action alleges:

See Lin, figs. 1-6 and text on col. 4-8 which discloses the claimed method for electrically testing a flip-chip semiconductor assembly 10 during its manufacture, the assembly being formed from a substrate 22, 34 and one or more IC die 12 (see fig. 4), including connecting the substrate 22 to the test apparatus at die-attach station 28 (test apparatus is not shown, see col. 7, lines 25-31); aligning and **bringing the one or more IC die 12 into a flip-chip-type conductive contact with the substrate 22, 34 so** interconnection bump 16 on the IC die are in conductive contact with the conductive pads 24 on the surface of the substrate 22 (fig. 1) **while it is connected to the test apparatus at the die-attach station 28** to form flip-chip semiconductor assembly; and electrically testing the assembly at the die-attach station 22 using the test apparatus. (Office Action, pp. 3-4; emphasis added).

Applicants respectfully disagree that the Lin reference anticipates Applicants' invention as claimed in independent claim 4 which reads:

4. A method for electrically testing a flip-chip semiconductor assembly during its manufacture, the assembly being formed from a substrate and one or more integrated circuit (IC) dice, the method comprising:
connecting the substrate to a test apparatus at a die-attach station;
bringing the one or more IC dice into a flip-chip-type conductive contact with the substrate while it is connected to the test apparatus at the die-attach station to form the flip-chip semiconductor assembly; and
electrically testing the assembly at the die-attach station using the test apparatus.
(Emphasis added.)

In contrast, the Lin reference discloses:

the shortcoming that "flip chip devices are unable to be burned-in using existing testing equipment (col. 3, lines 58-60)".

Therefore, "[t]he present [Lin] invention utilizes an interposer which is coupled to an active surface of a semiconductor die (col. 3, lines 67-68)" wherein "the interposer can be designed to include test contacts which permit the composite semiconductor device to be burned-in individually using a test

socket or simply be contacting either [the interposer's] top-side or edge test contacts (col. 4, lines 4-8)."

"The present [Lin] invention does not require an additional layer of metallization on the semiconductor die to transform the peripheral solder bumps into an array configuration. Instead, the present [Lin] invention incorporates a rigid interposer 22, as illustrated in FIG. 1, to achieve a desired terminal configuration. **Semiconductor die 12 is attached to interposer 22** such that solder bumps 16 align to, and are in electrical contact with, a plurality of electrical via 24 provide in the interposer." (Col. 4, lines 46-55; emphasis added).

"Electrical vias 24 extend from a top surface of interposer 22 to a bottom surface where a plurality of solder balls are formed. FIG. 3 illustrates a configuration of solder balls 32 which correspond with the electrical via configuration of interposer 22. The solder balls also correspond with an electrical terminal configuration of a substrate (not shown)." (Col. 5, lines 1-7).

"[T]he use of an interposer in accordance with the present [Lin] invention also establishes a method of testing and burning-in a flip chip semiconductor device. For instance, interposer 22 of FIG.1 is provided with a plurality of test contacts 28 located around the interposer periphery." (Col. 7, lines 3-8).

"The presence of test contacts 28 permit the use of conventional probe needles (not shown) to test the functionality of the die. Furthermore, having test contacts 28 extend at least partially along a side of the interposer allows the composite flip chip semiconductor device to be tested and burned-in in a known test socket which is capable of handling edge contacts." (Col. 7, lines 25-31).

"[I]t has been revealed [in Lin] that a device in accordance with the present invention can be individually burned-in by providing test contacts on an interposer which is coupled to a flip chip semiconductor die. The test contacts can be formed so that the contacts are compatible with a test socket or so that the contacts can be tested with conventional probe needles." (Col. 7, lines 57-64).

Clearly, the Lin reference discloses attaching an interposer to a semiconductor die to provide a footprint that is acceptable for standard test sockets. Nothing within the Lin reference even alludes to "bringing the one or more IC dice into a flip-chip-type conductive contact with the substrate while it is connected to the test apparatus at the die-attach station" as claimed by Applicants in amended independent claim 4. Additionally, the only testing described in the Lin reference is burn-in testing and the die attach station is not within a burn-in tester.

Therefore, independent claim 4, and claims 5-7 depending therefrom, are not anticipate by the Lin reference under 35 U.S.C. § 102. Accordingly, such claims are allowable over the cited prior art and Applicants respectfully request that such rejections be withdrawn.

ENTRY OF AMENDMENTS

The amendments to claim 7 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1-7 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to be "K. Johanson", is enclosed within a hand-drawn oval. A long horizontal line extends from the right side of the oval.

Kevin K. Johanson
Registration No. 38,506
Attorney for Applicant(s)
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: November 24, 2004
KKJ/ps:rh

Attachments: Replacement Sheet(s) (drawings)
Annotated Sheet(s) Showing Changes (drawings)

Document in ProLaw

IN THE DRAWINGS:

The attached sheets of drawings include changes to FIGS. 1 and 3. These sheets, which include FIGS. 1 and 3 only, replace the previous drawing sheets submitted for these Figures. In FIG. 1, the acronym for “KNOWN GOOD DICE” has been changed from (Kgd) to (KGD). In FIG. 3, “IN-SITU TEST SOCKET” has been changed to “IN-LINE TEST SOCKET.” (See attached Replacement Sheets and Annotated Sheets Showing Changes.)



ANNOTATED SHEET SHOWING
CHANGES

Filing Date: October 23, 2003

Serial No.: 10/693,286

Docket No.: 2269-3437.7US

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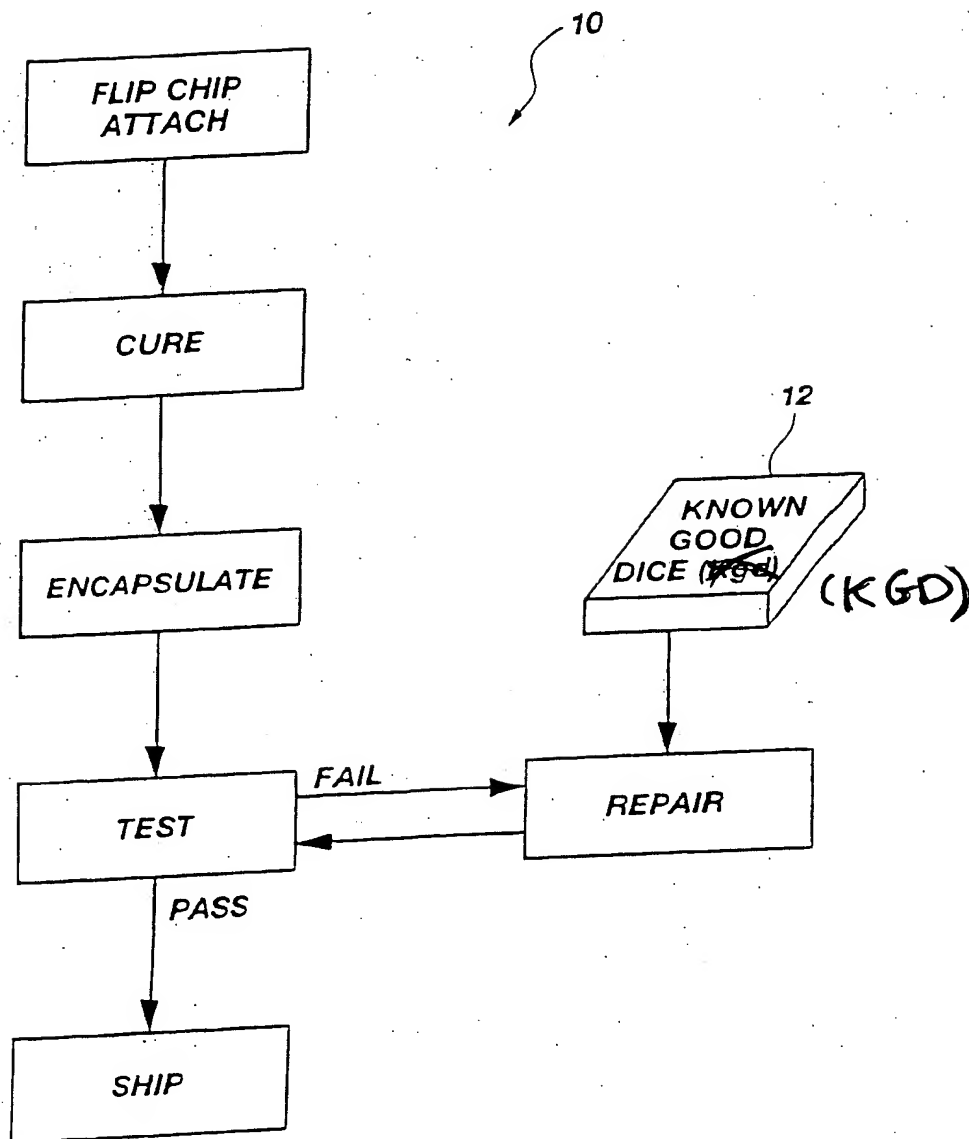


Fig. 1
(PRIOR ART)

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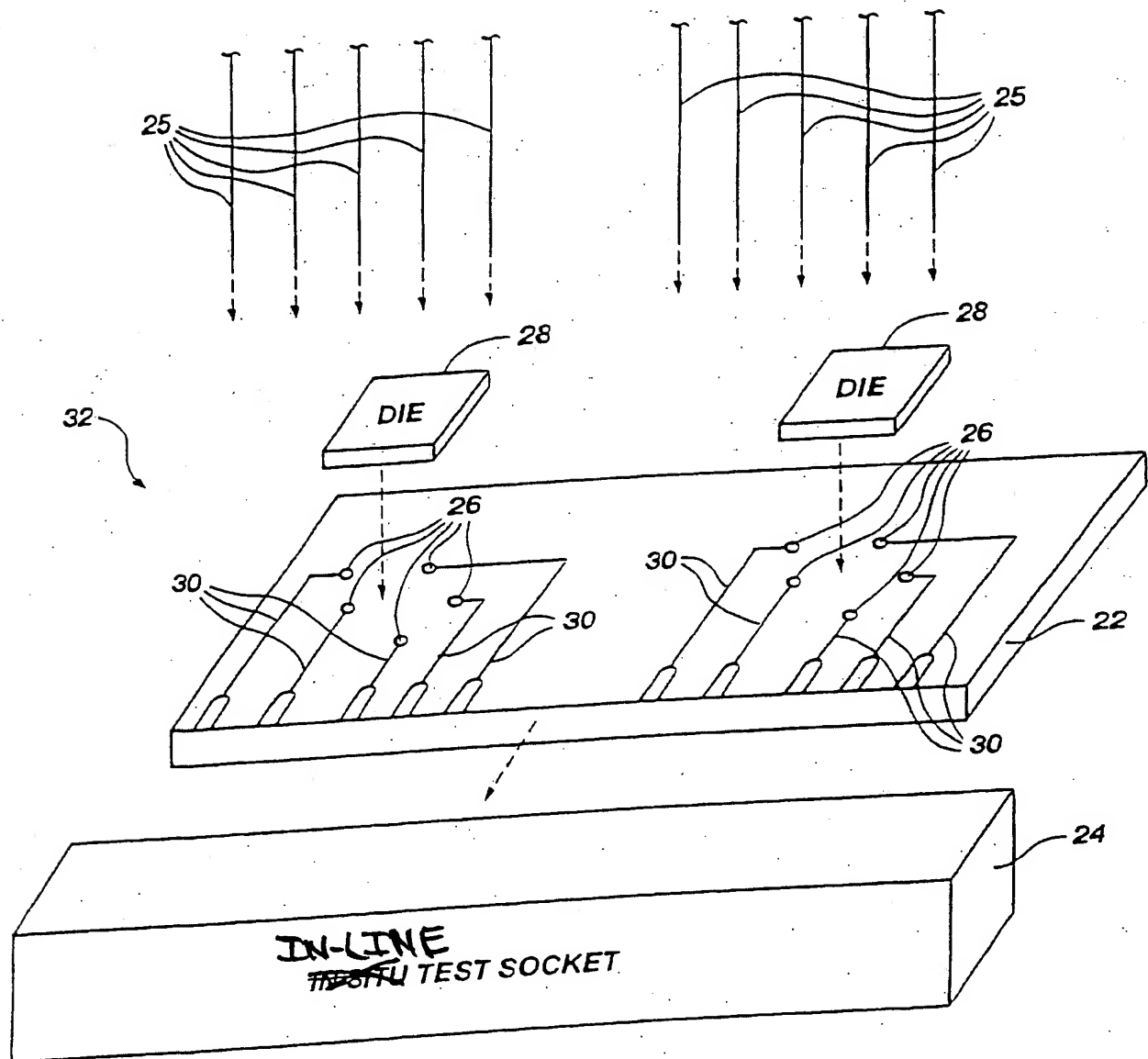


Fig. 3